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1) **Develop a Java program to take user input for name and age and display a welcome message.**

Program:

```java
import java.util.Scanner;

public class Assignment1 {
    public static void main(String[] args) {
        Scanner obj = new Scanner(System.in);
        String name;
        System.out.print("Enter Your name : ");
        name = obj.nextLine();
        System.out.print("Enter Your Age : ");
        int age = obj.nextInt();
        System.out.format("Welcome %s!\nAge : %d", name, age);
    }
}
```

Output :

Enter Your name : Rajat

Enter Your Age : 18

Welcome Rajat!

Age : 18

2) *Write a Java program that takes two numbers and performs basic arithmetic operations (+, –, , /).*

Program:

```java
import java.util.Scanner;

public class Assignment2 {
    public static void main(String[] args) {
        Scanner obj = new Scanner(System.in);
        int a, b;
```

```java
        System.out.print("Enter First No : ");
        a = obj.nextInt();
        System.out.print("Enter Second No : ");
        b = obj.nextInt();

        System.out.println("1. Addition");
        System.out.println("2. Subtraction");
        System.out.println("3. Multiplication");
        System.out.println("4. Division");
        System.out.print("Enter your choice: ");
        int ch = obj.nextInt();

        if (ch == 1) {
            System.out.format("%d + %d = %d", a, b, a + b);
        } else if (ch == 2) {
            System.out.format("%d - %d = %d", a, b, a - b);
        } else if (ch == 3) {
            System.out.format("%d * %d = %d", a, b, a * b);
        } else if (ch == 4) {
            System.out.format("%d / %d = %d", a, b, a / b);
        } else {
            System.out.print("Invalid choice!");
        }
    }
}
```

Output:

Enter First No : 10

Enter Second No : 5

1. Addition

2. Subtraction

3. Multiplication

4. Division

Enter your choice: 3

10 * 5 = 50

3) Create a program to convert temperature from Fahrenheit to Celsius.

Program :

```java
import java.util.Scanner;

public class Assignment3 {
    public static void main(String[] args) {
        Scanner obj = new Scanner(System.in);
        System.out.print("Enter Temperature in Fahrenheit : ");
        float fahrenheit = obj.nextFloat();

        float celsius = (5 * (fahrenheit - 32)) / 9f;
        System.out.println("Value of temperature in ℃ : " + celsius);
    }
}
```

Output:

Enter Temperature in Fahrenheit : 98.6

Value of temperature in ℃ : 37.0

4) Design a Java application to calculate simple interest using the formula: SI = (P × R × T) / 100.

Program:

```java
import java.util.Scanner;
public class Assignment4 {
    public static void main(String[] args) {
        Scanner obj = new Scanner(System.in);
        System.out.print("Enter Principal amount: ");
        int p = obj.nextInt();
```

```java
        System.out.print("Enter Rate: ");

        float r = obj.nextFloat();

        System.out.print("Enter Time: ");

        float t = obj.nextFloat();


        float si = (p * r * t) / 100;

        System.out.print("Simple Interest: " + si);

    }

}
```

Output:

Enter Principal amount: 10000

Enter Rate: 5

Enter Time: 2

Simple Interest: 1000.0

5) Write a Java program to determine whether a given year is a leap year.

Program :

```java
import java.util.Scanner;
public class Assignment5 {
    public static void main(String[] args) {
        Scanner obj = new Scanner(System.in);
        System.out.print("Enter Year: ");
        int year = obj.nextInt();

        if ((year % 100 != 0 && year % 4 == 0) || (year % 400 == 0)) {
            System.out.print("Leap year");
        } else {
            System.out.print("Not Leap year");
        }
    }
}
```

Output:

Enter Year: 2024

Leap year

6) Develop a program to check whether an input number is prime or not using for loop.

Program:

```java
import java.util.Scanner;

public class PrimeCheck {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter a number: ");
        int num = sc.nextInt();
        boolean isPrime = true;
        if (num <= 1) {
            isPrime = false;
        } else {
            for (int i = 2; i <= num / 2; i++) {
                if (num % i == 0) {
                    isPrime = false;
                    break;
                }
            }
        }
        if (isPrime)
            System.out.println(num + " is a Prime Number.");
        else
            System.out.println(num + " is Not a Prime Number.");
    }
}
```

Output:

Enter a number: 7

7 is a Prime Number.

7) Write a program to reverse a number using a while loop.

Program:

```java
import java.util.Scanner;
public class Assigntment7 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter a number: ");
        int num = sc.nextInt();
        int rev = 0;

        while (num != 0) {
            int digit = num % 10;
            rev = rev * 10 + digit;
            num = num / 10;
        }
        System.out.println("Reversed Number: " + rev);
    }
}
```

Output:

Enter a number: 12345

Reversed Number: 54321

8) Create a Java application to generate Fibonacci series up to a given number using do-while loop

Program :

```java
import java.util.Scanner;


public class FibonacciSeries {
```

```java
    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        System.out.print("Enter limit for Fibonacci series: ");

        int n = sc.nextInt();


        int a = 0, b = 1;

        System.out.print("Fibonacci Series: " + a + ", " + b);

        int c;

        do {

            c = a + b;

            if (c <= n)

                System.out.print(", " + c);

            a = b;

            b = c;

        } while (c <= n);

    }

}
```

Output:

Enter limit for Fibonacci series: 20

Fibonacci Series: 0, 1, 1, 2, 3, 5, 8, 13

9) Design a recursive program to compute the factorial of a number using function.

Program:

```java
import java.util.Scanner;

public class Assignment9{

    static int factorial(int n) {

        if (n == 0 || n == 1)

            return 1;

        else

            return n * factorial(n - 1);

    }
```

```java
    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        System.out.print("Enter a number: ");

        int num = sc.nextInt();

        int fact = factorial(num);

        System.out.println("Factorial of " + num + " is: " + fact);

    }

}
```

Output:

Enter a number: 5

Factorial of 5 is: 120

10) Implement a program to check whether a given number is an Armstrong number.

Program:

```java
import java.util.Scanner;

public class Assignment10{

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        System.out.print("Enter a number: ");

        int num = sc.nextInt();


        int temp = num;

        int sum = 0;

        while (temp != 0) {

            int digit = temp % 10;

            sum += digit * digit * digit;

            temp = temp / 10;

        }

        if (sum == num)
```

```
        System.out.println(num + " is an Armstrong Number.");

    else

        System.out.println(num + " is Not an Armstrong Number.");

    }

}
```

Output:

Enter a number: 153

153 is an Armstrong Number.

11) Write a Java program to find the largest and smallest number in an array.

Program:

```java
import java.util.Scanner;

public class Assignment11{
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter number of elements: ");
        int n = sc.nextInt();
        int[] arr = new int[n];

        System.out.println("Enter " + n + " elements:");
        for (int i = 0; i < n; i++) {
            arr[i] = sc.nextInt();
        }
        int largest = arr[0];
        int smallest = arr[0];
        for (int i = 1; i < n; i++) {
            if (arr[i] > largest)
                largest = arr[i];
            if (arr[i] < smallest)
                smallest = arr[i];
```

```
        }


    System.out.println("Largest number: " + largest);

    System.out.println("Smallest number: " + smallest);

    }

}
```

Output:

Enter number of elements: 5

Enter 5 elements:

12

34

45

66

78

Largest number: 78

Smallest number: 12

12) Develop a program to sort an array using bubble sort algorithm.

Program:

```
import java.util.Scanner;

public class BubbleSort {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter number of elements: ");
        int n = sc.nextInt();
        int[] arr = new int[n];
        System.out.println("Enter " + n + " elements:");
        for (int i = 0; i < n; i++) {
            arr[i] = sc.nextInt();
```

```
        }


        for (int i = 0; i < n - 1; i++) {
            for (int j = 0; j < n - i - 1; j++) {
                if (arr[j] > arr[j + 1]) {
                    int temp = arr[j];
                    arr[j] = arr[j + 1];
                    arr[j + 1] = temp;
                }
            }
        }


        System.out.println("Sorted array:");
        for (int i = 0; i < n; i++) {
            System.out.print(arr[i] + " ");
        }
    }
}
```

Output:

Enter number of elements: 5

Enter 5 elements:

50

10

70

5

40

Sorted array:

5 10 40 50 70

13) **Implement linear search to find an element in an array.**

Program:

```java
import java.util.Scanner;

public class Assignment13 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter number of elements: ");
        int n = sc.nextInt();
        int[] arr = new int[n];

        System.out.println("Enter " + n + " elements:");
        for (int i = 0; i < n; i++) {
            arr[i] = sc.nextInt();
        }

        System.out.print("Enter element to search: ");
        int key = sc.nextInt();
        boolean found = false;

        for (int i = 0; i < n; i++) {
            if (arr[i] == key) {
                System.out.println(key + " found at position " + (i + 1));
                found = true;
                break;
            }
        }
        if (!found)
            System.out.println(key + " not found in the array.");
    }
}
```

Output:

Enter number of elements: 5

Enter 5 elements:

14

98

57

23

12

Enter element to search: 5

5 not found in the array.

14) Implement binary search to find an element in an array.

Program:

```java
import java.util.Scanner;

public class Assignment14 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter number of elements: ");
        int n = sc.nextInt();
        int[] arr = new int[n];
        System.out.println("Enter " + n + " sorted elements:");
        for (int i = 0; i < n; i++) {
            arr[i] = sc.nextInt();
        }
        System.out.print("Enter element to search: ");
        int key = sc.nextInt();

        int low = 0, high = n - 1;
        boolean found = false;

        while (low <= high) {
            int mid = (low + high) / 2;
```

```java
            if (arr[mid] == key) {

                System.out.println(key + " found at position " + (mid + 1));

                found = true;

                break;

            } else if (arr[mid] < key) {

                low = mid + 1;

            } else {

                high = mid - 1;

            }

        }

        if (!found)

            System.out.println(key + " not found in the array.");

    }
}
```

Output:

Enter number of elements: 4

Enter 4 sorted elements:

1

4

6

10

Enter element to search: 4

4 found at position 2

15) Write a Java program to perform matrix addition using for loop

Program:

```java
public class MatrixAddition {

    public static void main(String[] args) {

        int[][] a = {

            {1, 2, 3},

            {4, 5, 6},
```

```java
        {7, 8, 9}
};

int[][] b = {
    {9, 8, 7},
    {6, 5, 4},
    {3, 2, 1}
};

int rows = a.length;
int cols = a[0].length;
int[][] sum = new int[rows][cols];

for (int i = 0; i < rows; i++) {
    for (int j = 0; j < cols; j++) {
        sum[i][j] = a[i][j] + b[i][j];
    }
}
System.out.println("Matrix A:");
for (int i = 0; i < rows; i++) {
    for (int j = 0; j < cols; j++) {
        System.out.print(a[i][j] + " ");
    }
    System.out.println();
}
System.out.println("\nMatrix B:");
for (int i = 0; i < rows; i++) {
    for (int j = 0; j < cols; j++) {
        System.out.print(b[i][j] + " ");
    }
    System.out.println();
```

```
        }

        System.out.println("\nResultant Matrix after Addition:");

        for (int i = 0; i < rows; i++) {

            for (int j = 0; j < cols; j++) {

                System.out.print(sum[i][j] + " ");

            }

            System.out.println();

        }

    }

}
```

Output:

Matrix A:

1 2 3

4 5 6

7 8 9

Matrix B:

9 8 7

6 5 4

3 2 1

Resultant Matrix after Addition:

10 10 10

10 10 10

10 10 10

16) Write a java program to find the sum of diagonal elements in an array.

Program:

```
class DiagonalSum {

    public static void main(String[] args) {

        int[][] matrix = {

            {1, 2, 3},
```

```
    {4, 5, 6},

    {7, 8, 9}

};

int sum = 0

for (int i = 0; i < matrix.length; i++) {

    sum += matrix[i][i]; // Primary diagonal elements

}


System.out.println("Sum of diagonal elements: " + sum);

    }

}
```

Output:

Sum of diagonal elements: 15

17) Check whether a given string is a palindrome.

Program:

```
import java.util.Scanner;

public class Assignment17{

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        System.out.print("Enter a string: ");

        String str = sc.nextLine();


        String rev = "";

        int len = str.length();


        for (int i = len - 1; i >= 0; i--) {

            rev = rev + str.charAt(i);

        }


        if (str.equalsIgnoreCase(rev))
```

```
            System.out.println(str + " is a Palindrome String.");

        else

            System.out.println(str + " is Not a Palindrome String.");

    }

}
```

Output:

Enter a string: Nayan

Nayan is a Palindrome String.

18) Count the number of vowels, consonants, digits, and special characters in a string.

Program:

```
class CharacterCount {

    public static void main(String[] args) {

        String str = "Hello Java 123!";


        int vowels = 0, consonants = 0, digits = 0, specialChars = 0;


        str = str.toLowerCase(); // Convert to lowercase for easier checking


        for (int i = 0; i < str.length(); i++) {

            char ch = str.charAt(i);


            if (ch >= 'a' && ch <= 'z') {

                if (ch == 'a' || ch == 'e' || ch == 'i' || ch == 'o' || ch == 'u')

                    vowels++;

                else

                    consonants++;

            } else if (ch >= '0' && ch <= '9') {

                digits++;

            } else if (ch != ' ') { // Ignore spaces

                specialChars++;
```

```
        }
    }


        System.out.println("String: " + str);

        System.out.println("Vowels: " + vowels);

        System.out.println("Consonants: " + consonants);

        System.out.println("Digits: " + digits);

        System.out.println("Special Characters: " + specialChars);

    }
}
```

Output:

String: hello java 123!

Vowels: 4

Consonants: 5

Digits: 3

Special Characters: 1

19) Program to reverse the string using predefined methods in String class.

Program:

```
import java.util.Scanner;

public class Assignment19 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter a string: ");
        String str = sc.nextLine();
        String reversed = new StringBuilder(str).reverse().toString();
        System.out.println("Reversed String: " + reversed);
    }
}
```

Output:

Enter a string: Abhi

Reversed String: ihbA

20) Write a program to remove duplicate characters from a string.

Program:

```
class RemoveDuplicates {
    public static void main(String[] args) {
        String str = "programming";
        String result = "";

        for (int i = 0; i < str.length(); i++) {
            char ch = str.charAt(i);
            if (result.indexOf(ch) == -1) {
                result += ch;
            }
        }

        System.out.println("Original String: " + str);
        System.out.println("String after removing duplicates: " + result);
    }
}
```

Output:

Original String: programming

String after removing duplicates: progaming